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04/08/2005 04:55 PM

To Christopher Lichens/R9/USEPA/US@EPA

cc tperina@ch2m.com, cmclaugh@demaximis.com, "Chamberlin, David" <ChamberlinDC@cdm.com>

bcc

Subject Submittal of Draft OSS Work Plan Addendum No. 2

History: This message has been forwarded.

Hi Chris - OSS Work Plan Addendum No. 2 is attached as a pdf file, for your review. The animation files (Appendix A) are too large to transmit via e-mail, so they have been transmitted on a CD via overnight service for Monday afternoon delivery. Also included in the overnight package are copies of the color figures.

Regards, Sharon

on_site_soil_wp pdf

CDM

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Memorandum

To: *Chris Lichens - USEPA*

From: *Dave Chamberlin - CDM*
Sharon Wallin - CDM

Date: *April 8, 2005*

Subject: *On-Site Soils RI/FS Work Plan Addendum No. 2*
Scope of Work for Additional Investigation
Omega Chemical Superfund Site
10500-37240-T2.OSS.XTRA
10500-5.2.3

The purpose of this memorandum is to present the Preliminary Site Conceptual Model (SCM) for the Omega Chemical Superfund Site (Site), scope of work and rationale for additional investigation at the Site as part of the ongoing On-Site Soils (OSS) Remedial Investigation/ Feasibility Study (RI/FS).

1.0 Introduction

Under a 2001 Consent Decree (CD) with the U.S. Environmental Protection Agency (USEPA), the Omega Chemical Superfund Site PRP Organized Group (OPOG) is currently completing two distinct sets of activities at the Site, notably, an on-site soils RI/FS and a groundwater Engineering Evaluation/Cost Analysis (EE/CA). This work plan Addendum focuses on the collection of additional data needed to complete the on-site soils RI/FS. However, although the CD describes the RI/FS and EE/CA as essentially separate but parallel programs, the data collected under this work plan addenda are expected to have value to both programs. For example, lithologic and contaminant distribution data from the TerraPave property will primarily be used to assist in identifying source areas on the Omega property and, secondarily, to assist in the design of the EE/CA remedy. Data collected under this work plan addenda, therefore, are expected to fill data gaps related to both on-site soils and groundwater which occurs beneath and immediately down-gradient of the site.

The site conceptual model and scope of work detailed below were developed based on evaluation of historical sampling results and recent RI/FS results, data gaps identified during analysis of these data and requirements to support remedy selection. Work performed during late-2003 through the present was performed in accordance with the OSS RI/FS Work Plan (CDM, September 29, 2003) and OSS Work Plan Addendum (CDM, October 20, 2004). The procedures defined in these documents will be used for the field data collection proposed under this work plan addendum.

The objectives of the proposed additional investigation, preliminary SCM, proposed additional field tasks, schedule, data evaluation, and reporting are discussed below.

2.0 Objectives

The objectives of the additional investigations proposed in this addendum are as follows:

- Identify probable source areas
- Determine if elevated soil gas concentrations are associated with contaminated on-site soils, volatilization from groundwater, or both
- Identify migration pathways from source areas for both soil vapor and groundwater
- Collect additional characterization data to support remedy selection

3.0 Preliminary Site Conceptual Model

A preliminary site conceptual model has been developed to describe both the subsurface geologic framework and current knowledge on the distribution of contaminants in soil gas and vadose zone soils. Figure 1 shows the locations of all data collection points on the site for soil, soil gas and groundwater, and comprise the current dataset that is used to develop the site conceptual model. This conceptual model will evolve as additional data are collected at the site and current data gaps are filled. The first element of the site conceptual model is a description of the geologic framework at the site, since contaminated media occur within this framework and physical characteristics of the media are important in controlling pathways of migration for contaminants at the site. Information on the nature and extent of contaminants in soils and soil vapor is also an important element to include in the site conceptual model. The conceptual model provides a basis for designing additional data collection for the on-site soils characterization at the site to meet the objectives identified earlier. This conceptual model also addresses the issue of potential pathways for migration from currently uncertain source areas to the downgradient groundwater.

3.1 Geologic Framework

The distribution, properties and degree of interconnection of permeable units at the site is of prime importance. The report entitled "Revised Report Addendum for Additional Data Collection in the Phase 1A Area Omega Chemical Superfund Site Whittier, California" (CDM, 2005) presented a series of cross-sections describing the subsurface geology at the site and beneath the Phase IA area west of the site. Significant differences between the stratigraphy beneath the Omega site and the downgradient area to the west have been observed, based on the borings that have been drilled during previous investigations. Figures 3-22, 3-23 and 3-24 presented in the Phase IA data collection report (CDM, 2005) identify a consistent sand or gravelly sand zone comprising the upper aquifer interval that is intersected in a number of borings located along Putnam Street. Figure 2 in this report reproduces the cross-section location map, while Figures 3, 4 and 5 are the cross-sections reproduced from this report. These permeable sandy and gravelly intervals appear to thin and pinch out toward the east and are not present within the saturated zone on the Omega site. High levels of contamination are observed at well OW-1 on the site and in downgradient wells on Putnam Street, centered on well OW-8. The groundwater flow directions inferred from water level measurements on and near the site also indicate groundwater flows from the site toward Putnam Street (CDM, 2005). These two observations suggest that a permeable pathway is present from the site leading toward Putnam Street.

The geologic information is presented from another viewpoint in a flyby animation included on the CD-ROM in Appendix A. This visualization provides a summary of logs presented as vertically exaggerated columns at the location of each boring, with the lithology indicated by color. This animation runs in the windows media player and can be examined frame by frame, in addition to viewing the animated flyby. The blue color indicates the dominant lower permeability materials at the site that consist of primarily silt and clay. The orange color code comprises intermediate permeability materials, such as silty and clayey sands, while the yellow interval indicates relatively clean sands or sand and gravel units that are the most permeable intervals. Some intervals within the blue zones include gravely or sandy clay intervals, however, the dominant lithology is silt and clay, which will control the permeability of the material. For example, borings GP-1, GP-2, GP-3A and GP-6 all show the presence of a thin stringer (less that one foot thick) of silt and clay, which has sand or gravel within the dominant fine-grain matrix, at the approximate elevation corresponding to the upper aquifer zone. This thin stringer was not noted at other wells located on the property to the south, including OW-1, OW-1B. This absence of the gravely or sandy material in the logs for OW-1 and OW-1B may be due to differences in logging and sampling methodology. Several of the boring logs indicate the presence of more permeable sand intervals within the vadose zone. Boring GP-1 exhibits the most extensive presence of permeable sand intervals within the vadose zone, where several 1 to 2 foot thick sand zones were logged. Based on the visualization and cross-sections, these vadose zone sand intervals are limited in areal extent.

The presence of permeable intervals within the vadose zone is important at the site, since these zones could potentially serve as a migration pathway for soil vapor, or provide an interval where percolating fluids from the surface could accumulate and spread laterally. Evaluation of the presence and continuity of these sandy intervals in the vadose zone and the potential for interconnections with the upper aquifer are an important data gap to be filled during this investigation.

3.2 Contaminant Distributions

Another important aspect of the site conceptual model is the distribution of contaminants, since this provides an indication of possible source locations and pathways of migration. Contaminant data have been collected from soils and soil vapor on the site in several sampling episodes that have occurred since the mid-1990s. These sampling programs have used different methodologies and had various objectives, however, they do provide a qualitative view of the nature and extent of contamination within the vadose zone and allow identification of data gaps that need to be filled.

Figure 6 shows the locations where soil vapor has been sampled at the site, differentiating between sampling in 2004 and earlier sampling episodes. Most soil gas sampling has occurred at shallow depths, however, the 2004 programs included collecting soil gas at depths up to 24 feet. Deeper soil gas sampling was conducted during the drilling of OW-1B, where soil gas results to a depth of 60 feet were collected. Two different classes of volatile compounds are presented to represent conditions in soil vapor at the site. PCE is a widely distributed compound in soil and soil vapor at the site, and is also present in downgradient groundwater. Freons are also present at the site and may have contributions from other source areas. Available data from all sampling periods were pooled and converted to common measurement units for plotting.

Figures 7, 8 and 9 show the PCE concentrations in soil gas at depths of 6 feet, from 10 to 20 feet and at 24 feet, respectively. These figures do not include the utility corridor samples that were collected in 2004, since these samples represent possible preferential transport pathways. The most extensive areal coverage for PCE in soil vapor is shown on Figures 7 and 8, since sampling was most extensive at the 6 and 12 foot depths. Sampling at the 24 foot depth was limited to a few locations during the 2004 sampling campaign. Concentration trends between the 6 and 12 foot depths are variable, with some locations indicating increases with depth, while other locations showed the opposite trend. Some samples along the western and northern fence line at the site showed elevated PCE concentrations at both the 6 and 12 foot depths. The limited number of 24 foot depth samples showed a general decrease in concentration compared to the shallower depths at all but two locations. The highest concentrations of PCE are present along the western and northern portions of the Omega property, with few locations where concentrations were lower than 5 mg/m^3 at any of the sampling depths. The single deep soil gas profile sampled at well OW-1B indicated concentrations increase with depth and reached their maximum just above the water table. The majority of the available samples do not extend to a sufficient depth to assess the role of volatilization from the water table in controlling soil vapor concentrations.

Freons are extensively distributed at the site, and Freon-11 was selected as a surrogate compound to represent this class of contaminants. This compound was analyzed only in the 2004 sampling program, thus areal coverage is not as extensive as for PCE. Figures 10, 11 and 12 show Freon-11 concentrations at 6, 10 to 20, and 24 feet respectively. Freon-11 also shows variable trends with depth, with more locations decreasing with depth. Two locations at the 24 foot depth indicated that high concentrations of Freon-11 persisted to this depth. The highest concentrations for Freon-11 were located along the northern fence line and in the parking lot on the Omega site.

Soil sampling with depth has also been conducted at various times at the site. Two compounds were selected to represent distributions in the subsurface, PCE and 1,4-Dioxane. As with soil gas, PCE in soil is widespread and present at high concentrations in soil. PCE was selected to represent the volatile constituents. 1,4-Dioxane is important, since it may limit treatment options due to its recalcitrant nature, high mobility and low volatility. This compound was selected to represent low volatility compounds at the site and because treatement technologies that are applicable for the volatiles may not be applicable to the 1,4-Dioxane.

Soil sampling results for PCE are available at multiple depths, principally at locations along the western side of the property, and in nearby off-site areas to the west. Little information is available in the parking lot area between the Star City Auto and Three Kings Buildings. A summary of concentration distributions at 0 - 5 feet, 5 - 10 feet, 10 - 20 feet, 20 - 40 feet, 40 - 60 feet and greater than 60 feet are shown on Figures 13 through 18 respectively. Figures 13 and 14 show elevated concentrations are present in the upper ten feet of the vadose zone in the area west of the Star City Auto building. Little sampling was conducted outside of this area in the shallow zone. This contamination continues to the maximum depth of sampling in at least one location along the western site boundary, suggesting this area has the potential to be one of the sources at the site. Figure 17 shows that the areal extent of elevated concentrations of PCE in soil increases in the 40 to 60 foot interval. This apparent expansion may be due in part to the availability of more samples, since in recent sampling programs, intervals for sampling were selected based on indications of elevated contamination. Two possible mechanisms may potentially explain this expanded areal extent that suggests contaminants migrated laterally within this interval. Water levels in aquifers in this area have been dropping for many years. Water levels are currently at about 75 feet; however, they have been substantially higher in the basin in the past. No long-term records are available, however, water levels have been observed at well OW-1 during the site monitoring program. Figure 19 shows the hydrograph at this well since 2001, indicating a downward trend in water levels. This period includes a drought, which likely accelerated the rate of decline, however, water levels in the basin have been falling for many years. Contamination being carried downward through the vadose zone will commonly spread laterally when encountering the water table due to the partial barrier effect of the capillary fringe. Initial releases from the site likely occurred in the past when water levels were at a higher level, and ongoing releases from secondary sources in the soil continue to move to the current water table with the percolating recharge.

The other potential mechanism for allowing this expansion is the presence of subtle changes in permeability that would have a similar impact on percolating recharge that is carrying contamination downward. The boring logs do not suggest the presence of any strata that would cause this spreading to occur. A flyby animation illustrating the distribution of PCE in soil in three dimensions is also provided in Appendix A as a windows media player file. Concentration ranges observed in soil are indicated in color on the borehole column using an exaggerated vertical scale. This animation illustrates high near-surface concentrations, underlain by lower concentration, then increasing concentrations and an expansion in the zone of fluctuating water table, with the intermediate concentrations increasing above the water table.

Figures 20 and 21 show the distribution of 1,4-Dioxane in soil in the 0 - 30 and 30 - 60 foot intervals, respectively. Elevated concentrations are present at a number of locations, thus suggesting the potential for more widespread releases. This may be due in part to the availability of more surficial soil samples in the parking lot area between the buildings. Few samples are available at depth. Deeper sample results are similar to those observed for PCE, with elevated concentrations in the area west of the Star City Auto building.

4.0 Proposed Scope of Work and Procedures

Three major data collection tasks are required to meet the objectives that have been identified at the site. These tasks include installation and sampling of multi-depth soil vapor probes, Membrane Interface Probe (MIP) sampling, and soil sampling, via direct push/geoprobe, and analysis. A contingency for groundwater sampling from temporary borings is also included, if permeable intervals with indications of contamination are encountered. This program will be implemented in a sequential manner, with results from early phases of sampling providing input to the later phases, as shown in the flow chart on Figure 22. The scope of work to implement this program is described in this section. The data quality objectives for this effort are defined in Section 5. Data evaluation and the schedule for implementation are provided in Section 6.

Task 1 - Multi-depth Soil Vapor Sampling

The site conceptual model and past site measurements indicate significant concentrations of site contaminants are present in soil vapor at the site, both in the near surface interval and at depth. Limited sampling has been conducted at depths greater than 24 feet, so it is currently unknown whether the source of soil vapor contamination is from secondary sources in soil, from volatilization from the water table, or perhaps both. Figure 23 shows the proposed location of 12 new multi-depth soil vapor sampling locations. Seven of the locations (SV-1, SV-2, SV-3, SV-5, SV-7, SV-10 and SV-12) will be sampled at depths 6, 12, 18, 24 and 40 foot depths. Five of the locations (SV-4, SV-6, SV-8, SV-9 and SV-11) will be sampled at the above depths, plus the 50, 60 and 70 foot depths. This will result in 75 samples, plus associated quality control samples. These locations have been selected to cover data gap areas to assist in identifying potential source locations. The locations include areas near or downgradient of former sumps (SV-6 through SV-9), near former tank areas (SV-3, SV-4 and SV-5) and in other areas of the site to determine if soil vapor has been impacted by site contamination or to determine if previously identified shallow soil vapor contamination persists at depth (SV-1, SV-2, SV-10, SV-11, SV-12). The deeper borings will provide a basis for determining if volatilization from groundwater and/or the capillary fringe is a source of soil vapor contamination.

The soil vapor borings will be advanced using direct push technology. The sampling methodology will be the same as that used in the 2004 sampling program. Samples will be collected for TO15 analysis of VOC and Freon compounds in a fixed-base laboratory, in accordance with procedures provided in Appendix A of the Final Work Plan (CDM, 2003).

Data collected from the initial twelve locations will be assessed after receipt of useable laboratory results to determine if additional on-site sampling is required and to finalize locations for MIP sampling. Additional soil vapor sampling locations may be added, if initial results in the eastern and northern portions of the site indicate high concentrations of contaminants in the soil vapor. Results from the initial MIP sampling described in Task 2 will also be considered in selecting potential contingent soil vapor sampling locations.

Task 2 -MIP / Geoprobe Sampling

The Membrane Interface Probe (MIP) is advanced with a direct-push drill rig and gives continuous, real-time VOC readings at nominal one-foot intervals. This method uses a permeable membrane on the side of the probe to sample volatiles that are released by heating of adjacent soil. The volatiles are transported to the surface with a carrier gas and injected into a gas chromatograph for quantification of total VOCs. Because the results are qualitative and do not speciate the individual VOCs, additional borings will be advanced at selected locations in order to collect soil samples for laboratory analysis. This technique was used at three borings on and adjacent the Omega site in a previous sampling phase. This work demonstrated successful identification of more permeable zones using the soil conductivity probe, identification of low range CVOC concentrations with the electron capture detector (ECD) and high range VOC concentrations with the photoionization detector (PID).

Figure 24 shows the proposed twelve prescriptive locations for MIP sampling. The final locations may be moved based on access and utility considerations and results of the initial soil vapor sampling. Additional contingent locations may be added based on results of the initial MIP borings and soil vapor sampling. All borings will be advanced about five feet into the water table at depths of up to 85 feet. The on-site MIP borings (MIP-1, MIP-2, MIP-3, MIP-4, MIP-5 and MIP-6) are targeted for data gap areas (MIP-1, MIP-4), suspected source areas (MIP-3) or to define limits of contamination (MIP-2, MIP-5 and MIP-6). Additional contingent locations may be sampled on-site after selection based on the soil vapor sampling results. Off-site MIP locations will assist in defining stratigraphy and determine if contaminants have migrated from the site via sandy intervals within the vadose zone. These off-site locations will help define transport pathways from on-site soils to off-site groundwater and soil vapor.

A subset of sample locations will have soil samples collected using direct push technology. Locations will be selected based on results of prescribed and contingent MIP results. Locations showing presence of high concentrations of VOCs and presence of more permeable intervals associated with the VOCs will be targeted from soil sampling. A direct push boring will be placed within several feet of the MIP boring in a second phase of sampling. The probe will be pushed to the target depths for sampling and a soil core retrieved for analysis of VOCs, Freon compounds and 1,4-dioxane. Sampling and analysis procedures will follow those defined in the final work plan (CDM, 2003). It is anticipated that approximately 5 borings will be sampled, with up to 6 samples per boring, with intervals for sampling selected based on MIP results. In addition, a natural gamma geophysical log will be run through the casing at each of these soil sampling locations to assist in lithologic characterization.

Task 3 - Groundwater Sampling

A contingent sampling program for groundwater is proposed at up to five temporary locations that will be selected based on the results of Task 1 and 2. This sampling will be conducted in temporary completions using a Hydropunch tool. This device will be advanced to a depth of at least five feet below the water table adjacent to the selected boring. The tool will be opened to allow groundwater to flow into the sampler and retrieved at the surface. The objective of this sampling will be to assess screening level groundwater concentrations for VOCs and Freon compounds in permeable zones that may be encountered on or immediately downgradient of the site. This contingent sampling will only be conducted within permeable zones. All sampling will be conducted in accordance with the manufacturers documentation for the hydropunch tool. The tools will be decontaminated between each boring. This method will provide only screening level information, since the temporary sampling device will yield potentially turbid water. This will meet the objective for these temporary sampling locations, which is to determine if a permeable zone is acting as a transport pathway for high levels of contamination.

5.0 Data Quality Objectives

The data quality objectives (DQO) process is an iterative planning methodology designed to ensure that data collected at the site are appropriate for supporting remedial decisions. This process includes the following elements:

- Statement of the problem
- Identify the decisions
- Identify inputs to the decisions
- Define the study boundaries
- Develop a decision rule
- Specify limits on decision errors
- Optimize the design for obtaining data

The problem for purposes of the on-site soils investigation is defined by the objectives stated in Section 2. The final work plan for the site (CDM, 2003) identified comprehensive data quality objectives for the project. This addendum focuses on more specific issues associated with this sampling program. The location of sources of contaminants contributing to elevated concentrations in soil vapor and groundwater, and the pathways of migration have not been defined at the site. A site conceptual model has been formulated describing current knowledge of both the subsurface geology and contaminant distributions. For purposes of defining data collection requirements for this phase, contamination is assumed to consist of secondary sources in subsurface soil that are contributing contaminants to both soil vapor and groundwater. The primary pathways from these secondary sources are currently assumed to include both infiltration of recharge through these contaminated zones to groundwater, and volatilization leading to vapor phase migration.

Remedial decisions at the site include selection of a technology or technologies to address the on-site soils issues. The presence and distribution of permeable pathways has been identified as a critical element in the decision process at the site, since this impacts the ability to implement a remedy capable of controlling soil vapor and additional releases to groundwater. Prior to making decisions regarding remediation, additional site data to define the locations of secondary source materials and pathways of migration are needed. The site investigations are designed to determine the location of these sources.

The inputs to this decision consist of initial supplemental multi-depth soil vapor measurement for site contaminants. Soil vapor sampling will be conducted with analyses conducted at a fixed base laboratory to allow comparability to the 2004 soil vapor data and to allow use of these data for potential risk assessment use. Three dimensional concentration distributions will be used to define probable secondary sources that contribute to elevated soil vapor concentrations.

MIP sampling, including use of a soil conductivity tool, will be used to define site stratigraphy for the purpose of defining permeable pathways in the subsurface and to assess three-dimensional qualitative distributions of contaminants. These data will be used to select locations for subsequent soil sampling and analysis for site contaminants of concern. Contingent groundwater screening samples may also be collected to determine if identified permeable pathways are contaminated.

6.0 Data Evaluation, Reporting, and Schedule

It is anticipated that it will take approximately 12 weeks to mobilize and complete the field tasks described in Tasks 1, 2, and 3, followed by a four-week period to obtain the final analytical reports after the last field sampling in completed. The soil vapor sampling will be conducted initially and lab results will be used to finalize locations for subsequent sampling. The results of this and the prior OSS investigations will be included in the OSS RI/FS report, which will be submitted to USEPA 90 days following receipt of the final analytical reports.

cc: Tom Perina, CH2MHill
Chuck McLaughlin, *de maximis, inc.*

Figures

CDM

OMEGA CHEMICAL

Historical and RI/FS Sample Locations

Figure 1

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Figure 2
Omega Site Phase 1a Area
Well and Cross-Section Locations

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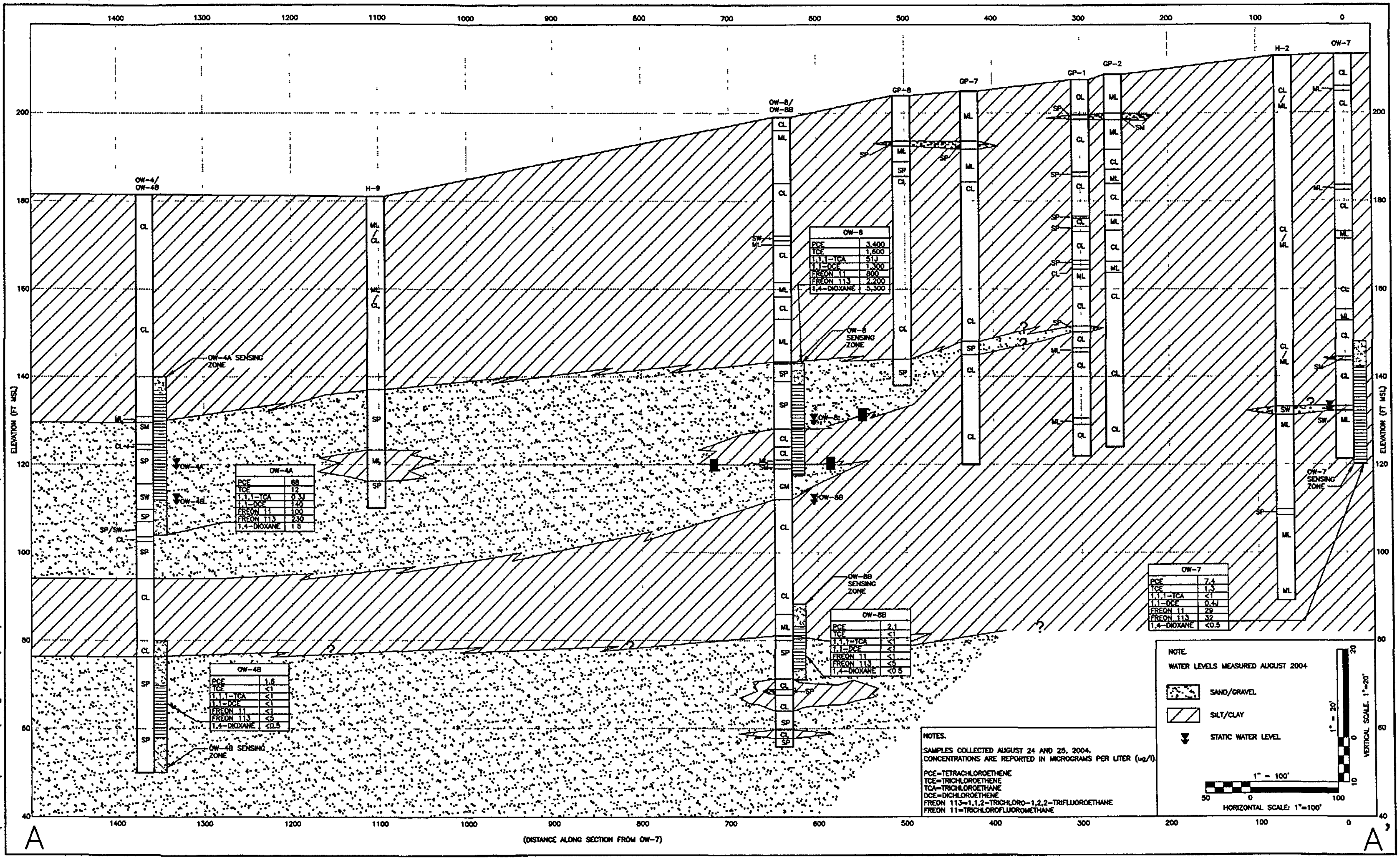

Figure 3
Omega Site Cross-Section A-A'

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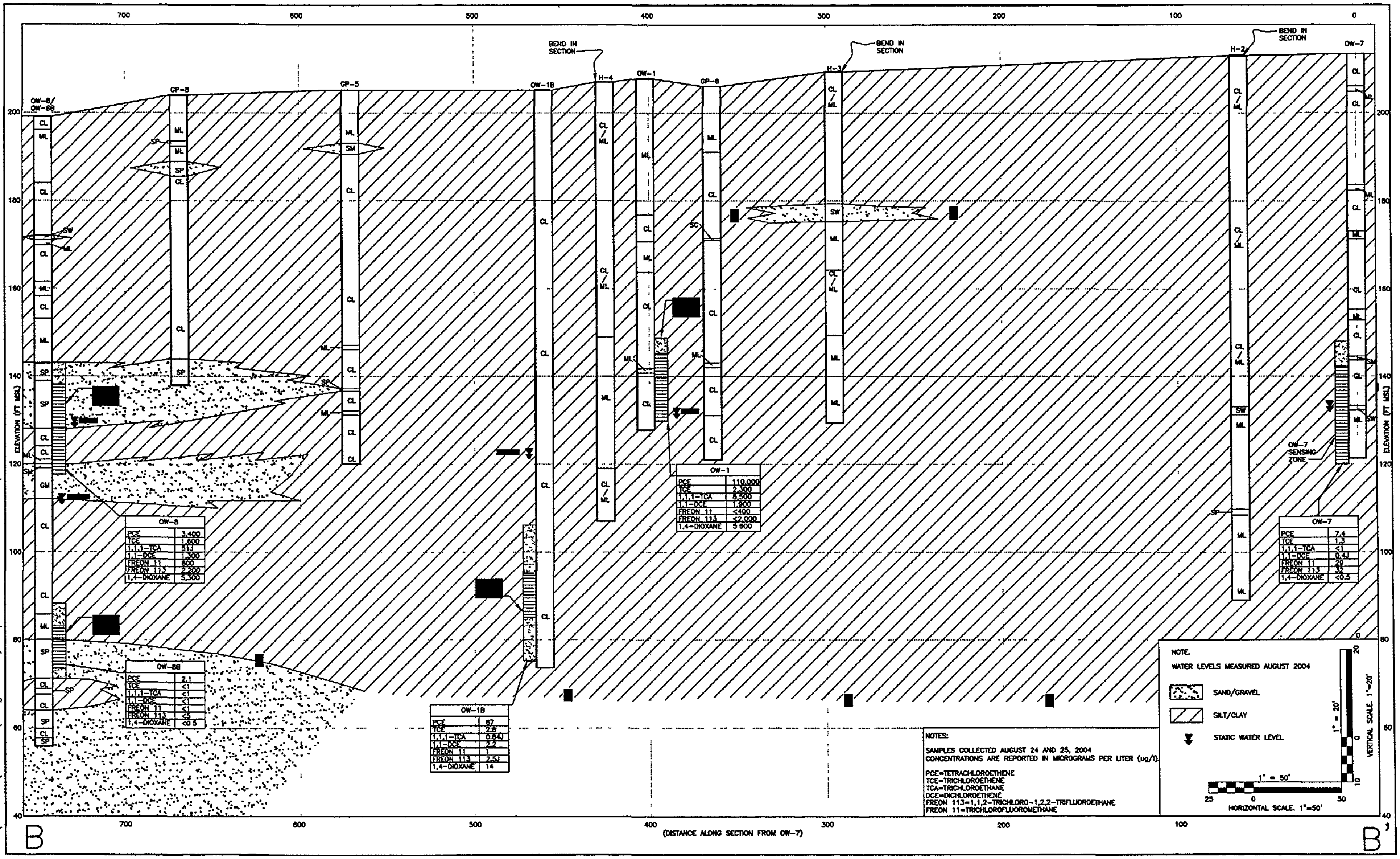

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Figure 4
Omega Site Cross-Section B-B'

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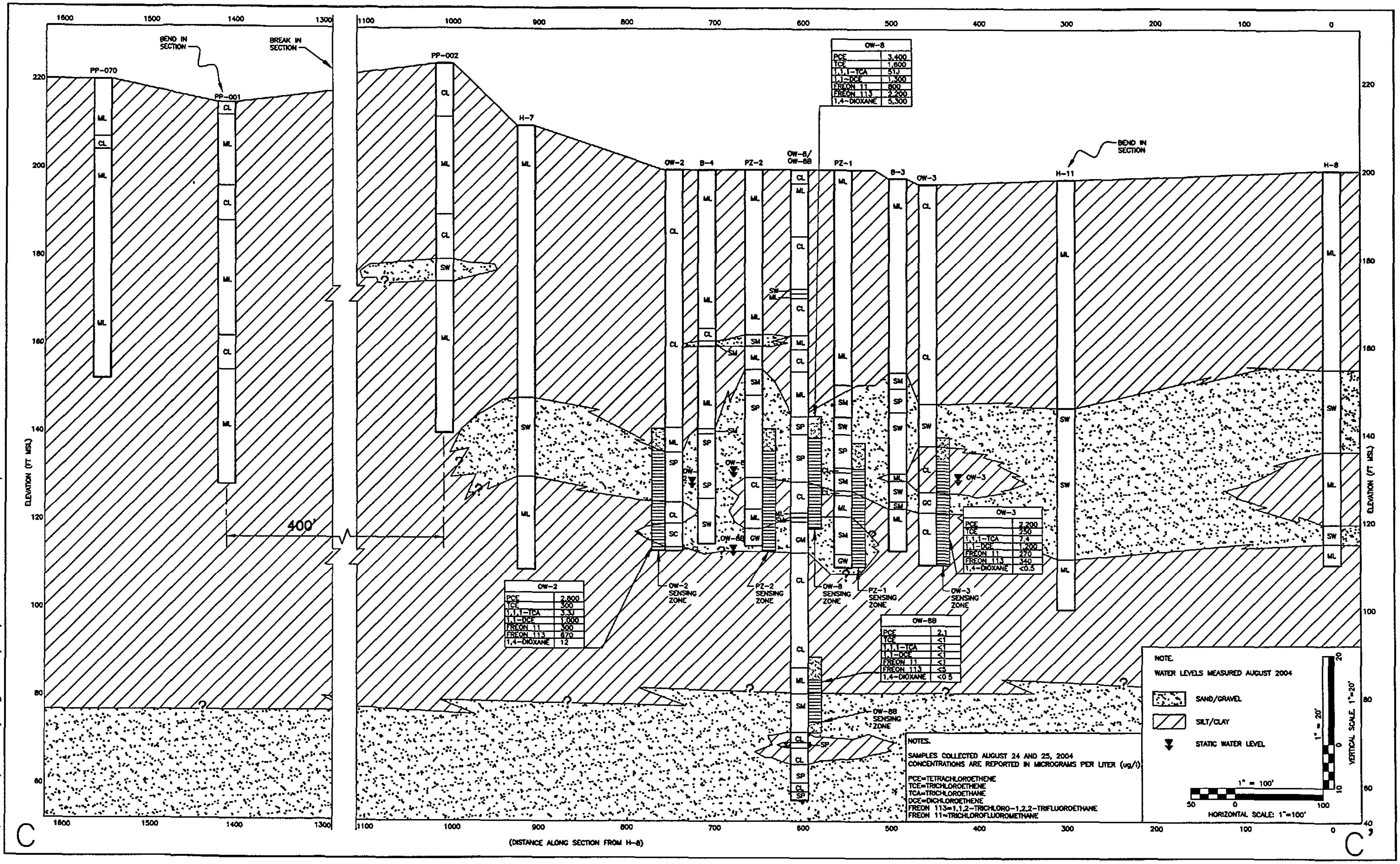

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Figure 5
Omega Site Cross-Section C-C'

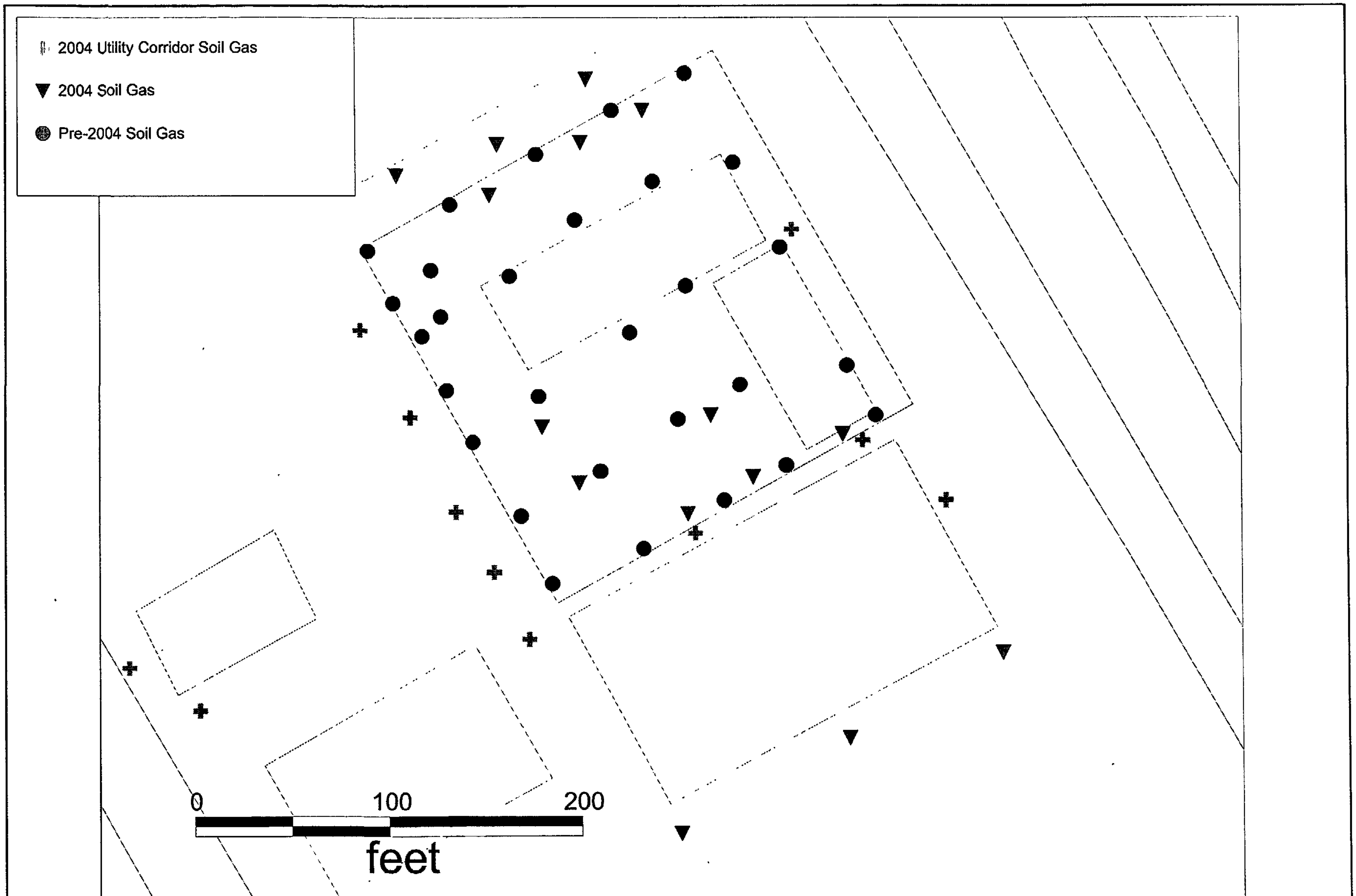

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Figure 6 Location of Existing Soil Vapor Samples

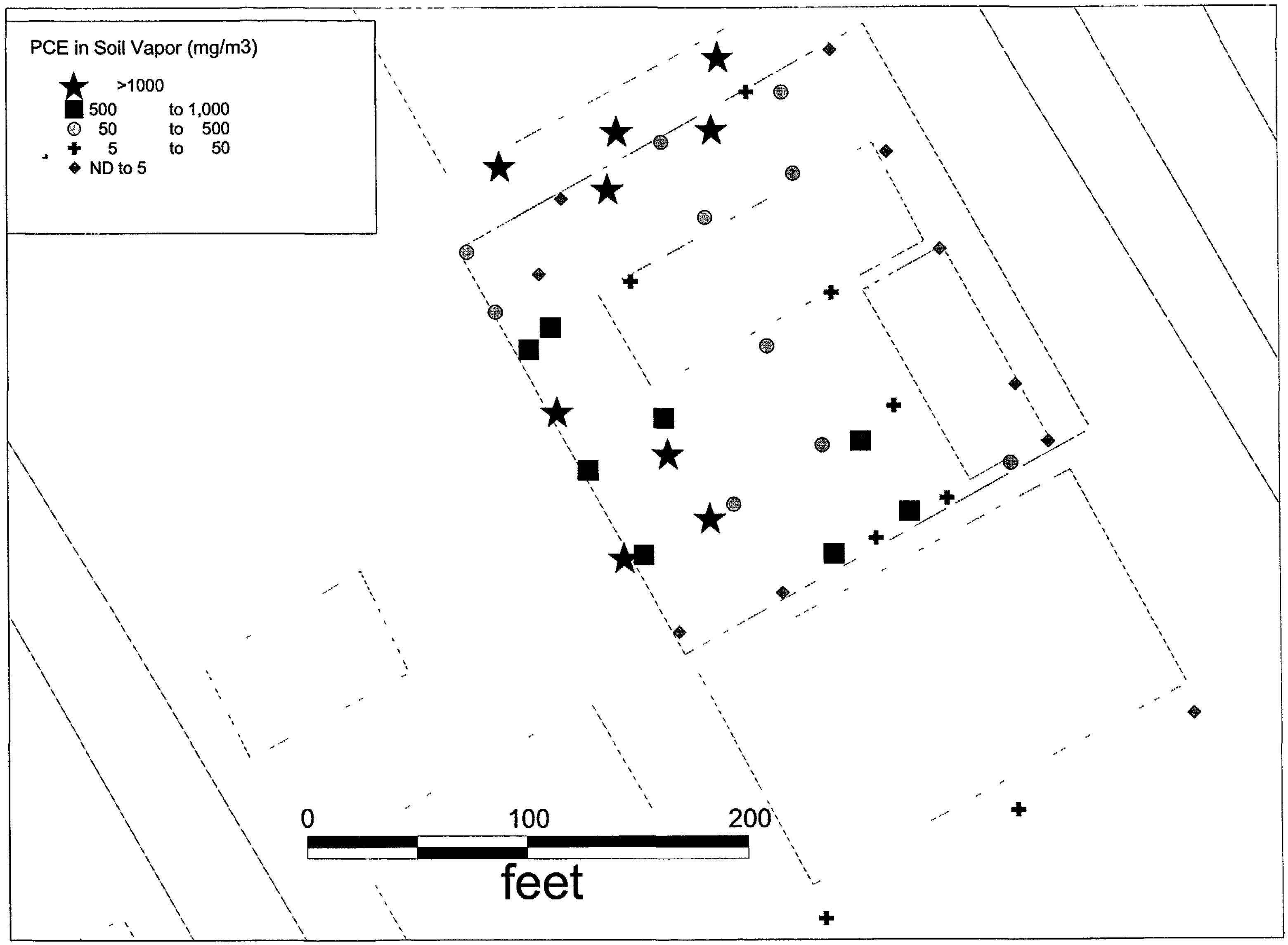

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Figure 7 1995 - 2004 Soil Gas Concentrations – PCE – 0 to 10 Foot Depth

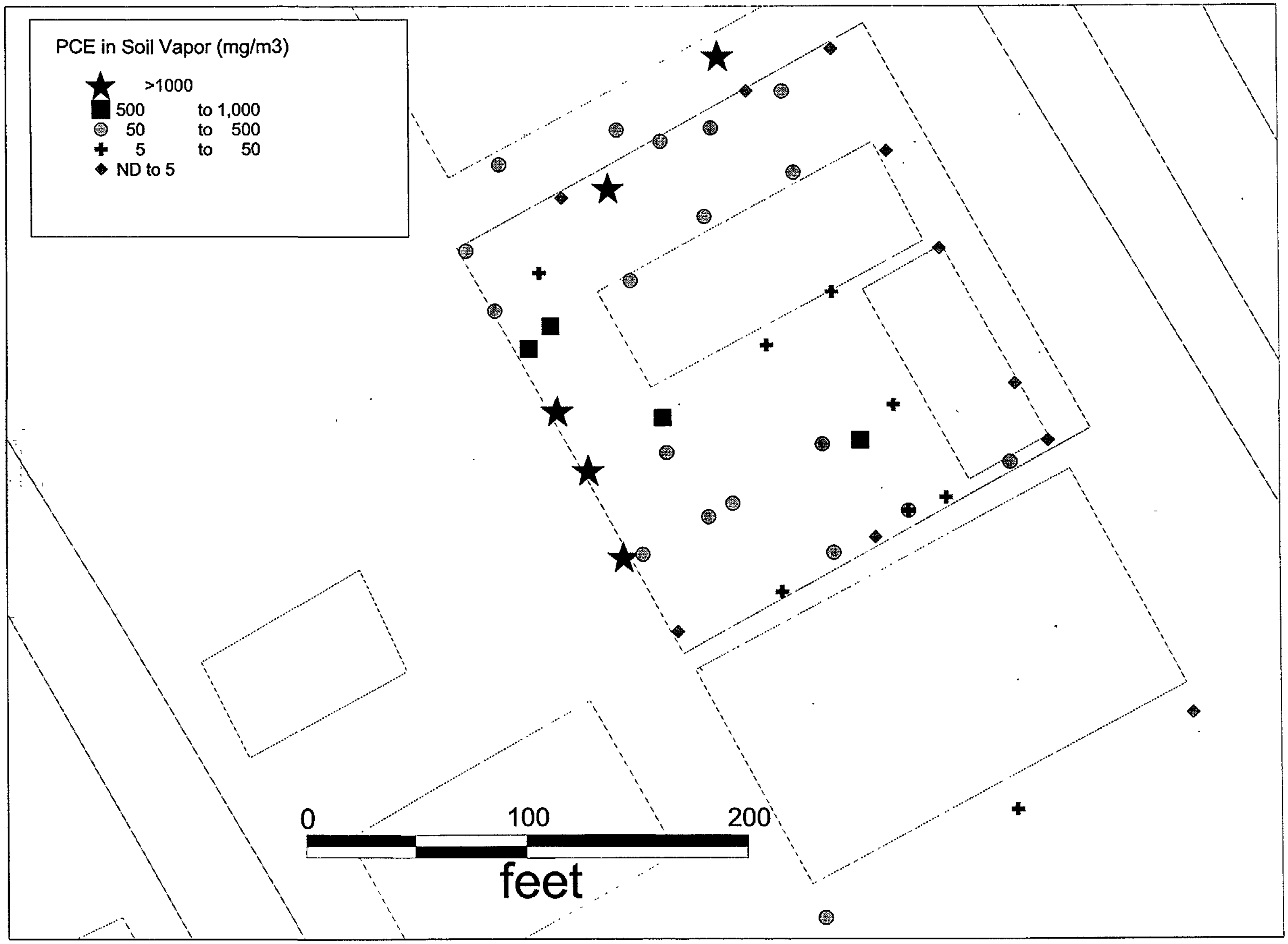

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Figure 8 1995 - 2004 Soil Gas Concentrations – PCE – 10 to 20 Foot Depth

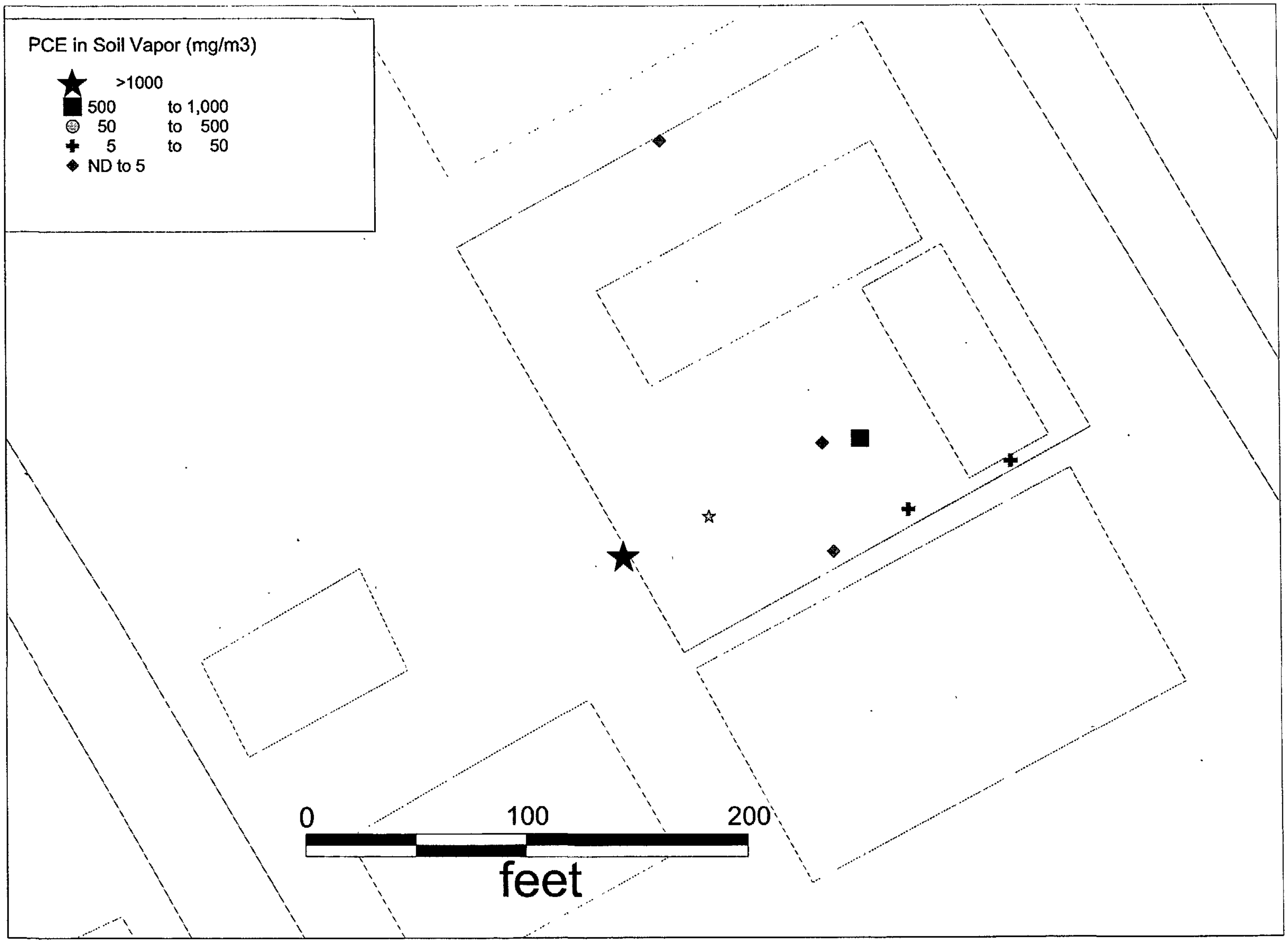

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Figure 9 1995 - 2004 Soil Gas Concentrations – PCE – 20 to 30 Foot Depth

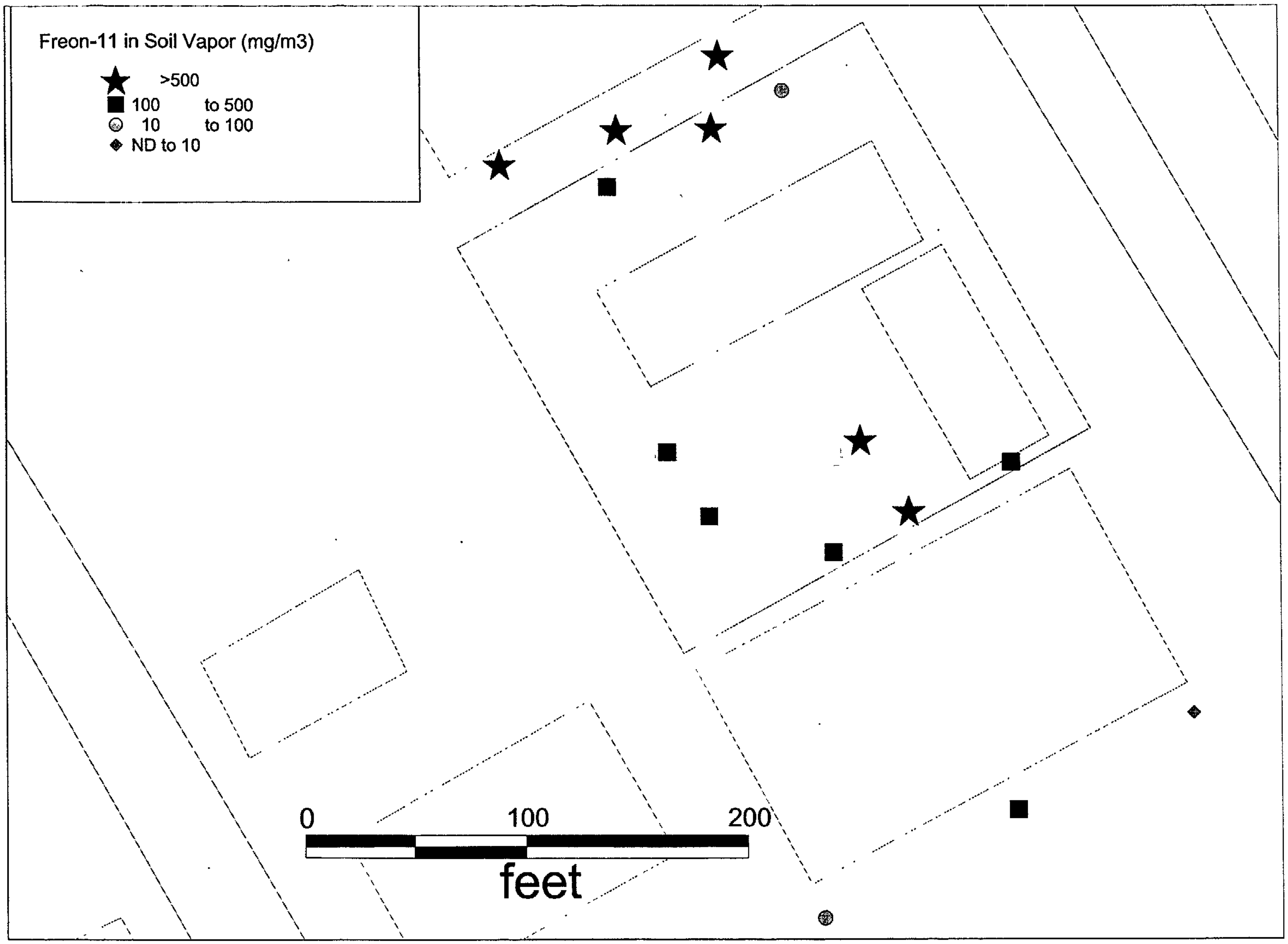

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Figure 10 2004 Soil Gas Concentrations – Freon 11 – 0 to 10 Foot Depth

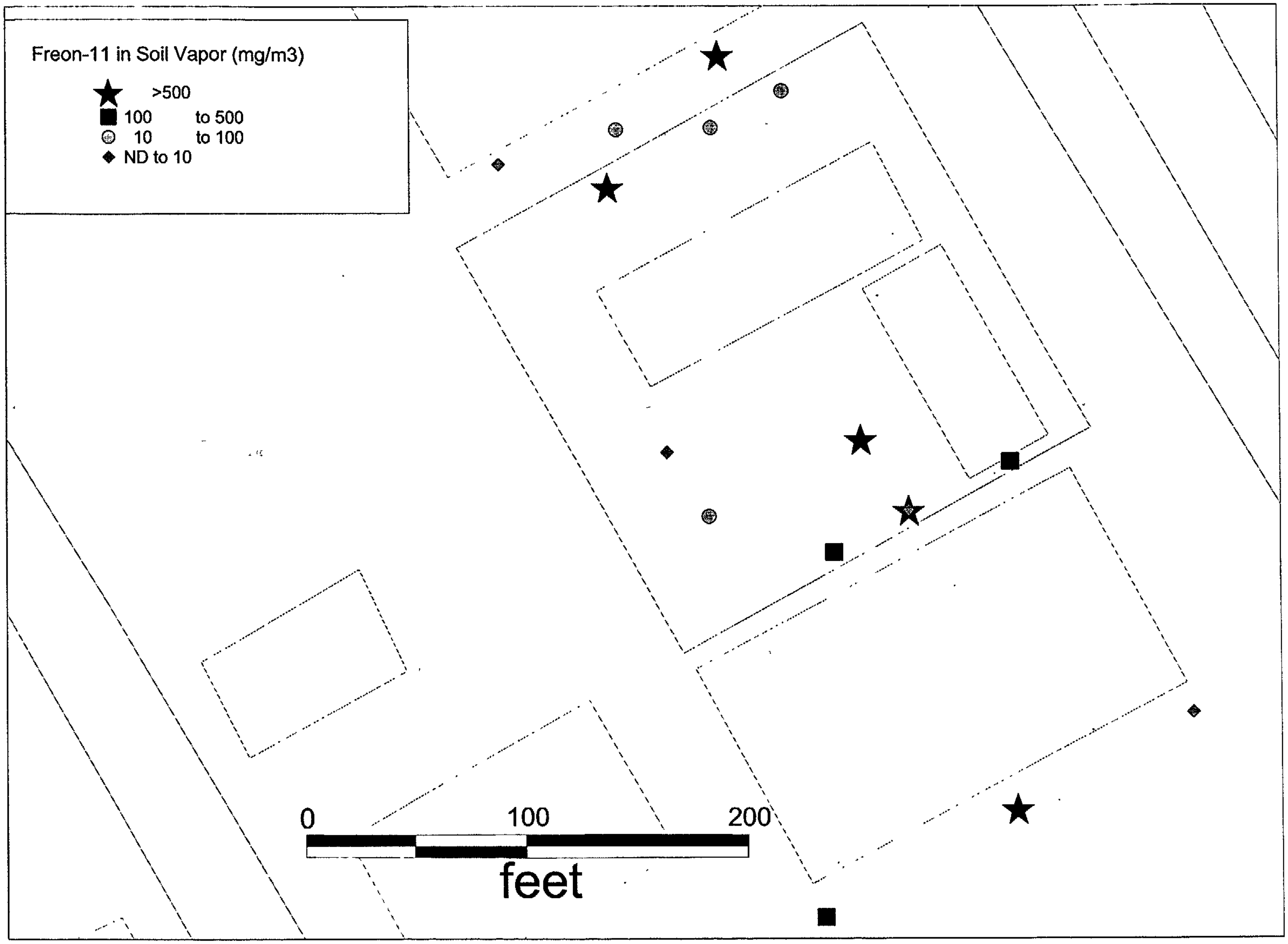

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Figure 11 2004 Soil Gas Concentrations – Freon 11 – 10 to 20 Foot Depth

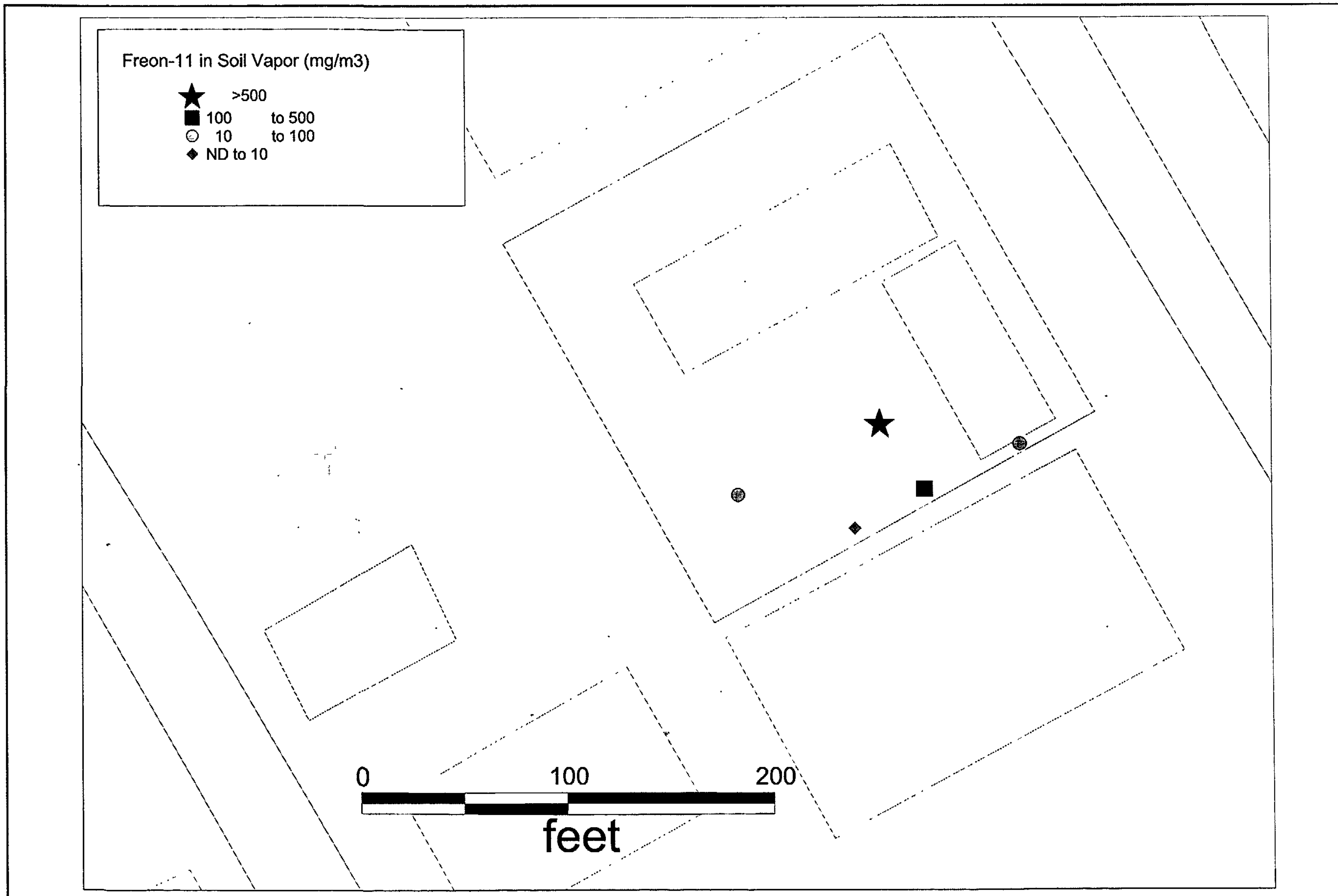

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Figure 12 2004 Soil Gas Concentrations – Freon 11 – 20 to 30 Foot Depth

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Figure 13 PCE in Soils 0 – 5 Feet

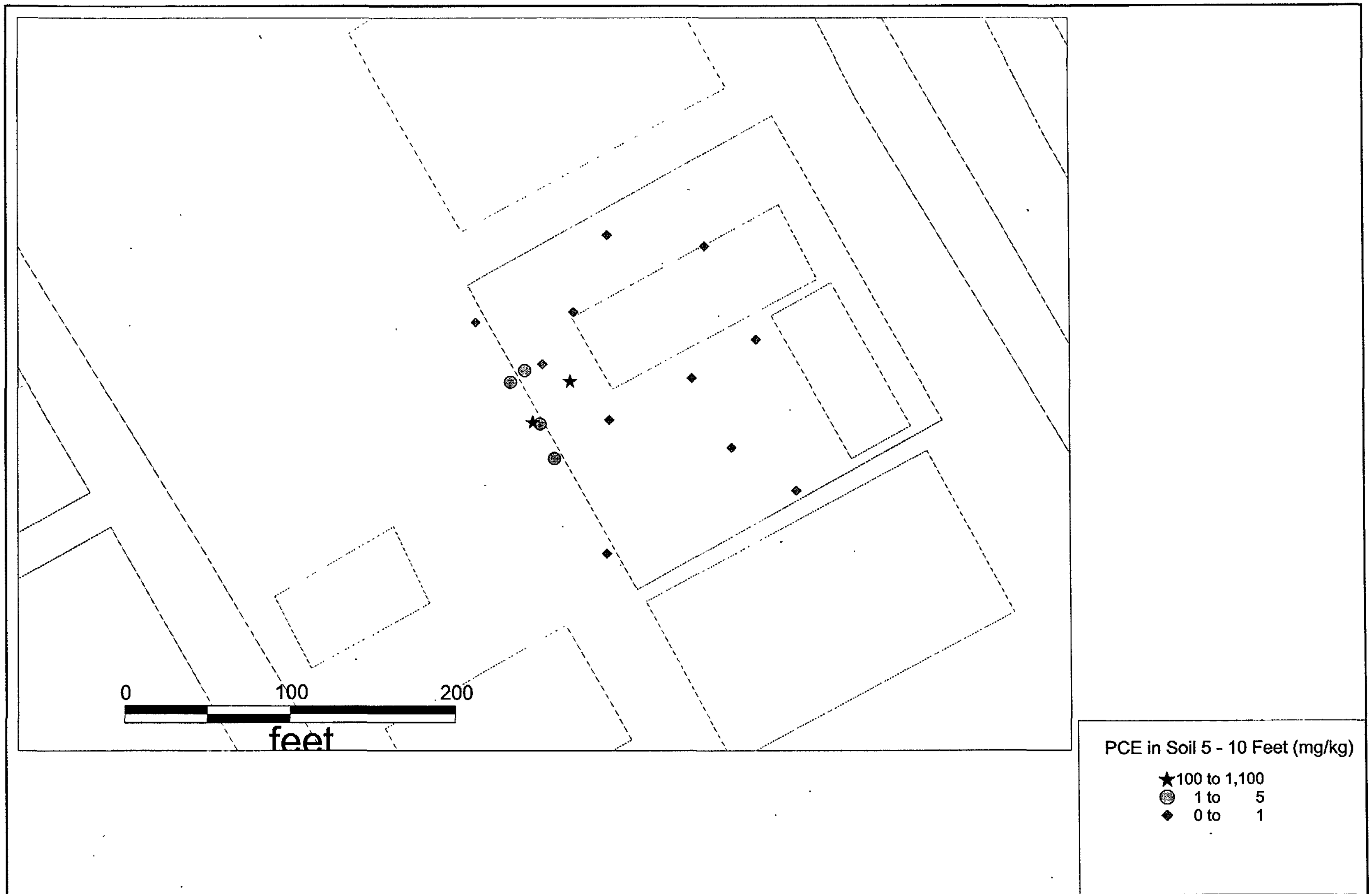

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Figure 14 PCE in Soils 5 – 10 Feet

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Figure 15 PCE in Soils 10 – 20 Feet

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Figure 16 PCE in Soils 20 – 40 Feet

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Figure 17 PCE in Soils 40 – 60 Feet

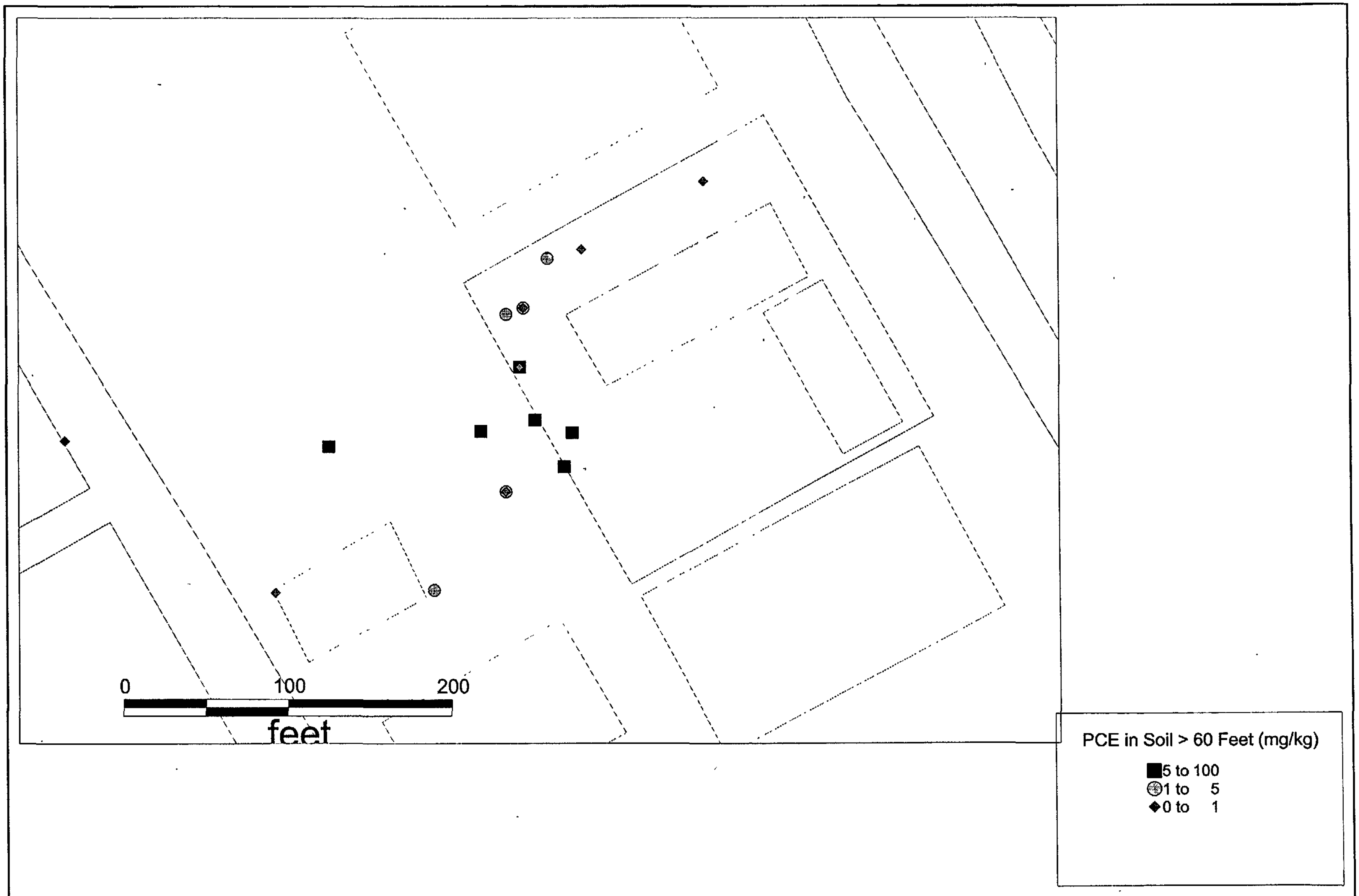

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Figure 18 PCE in Soils >60 Feet

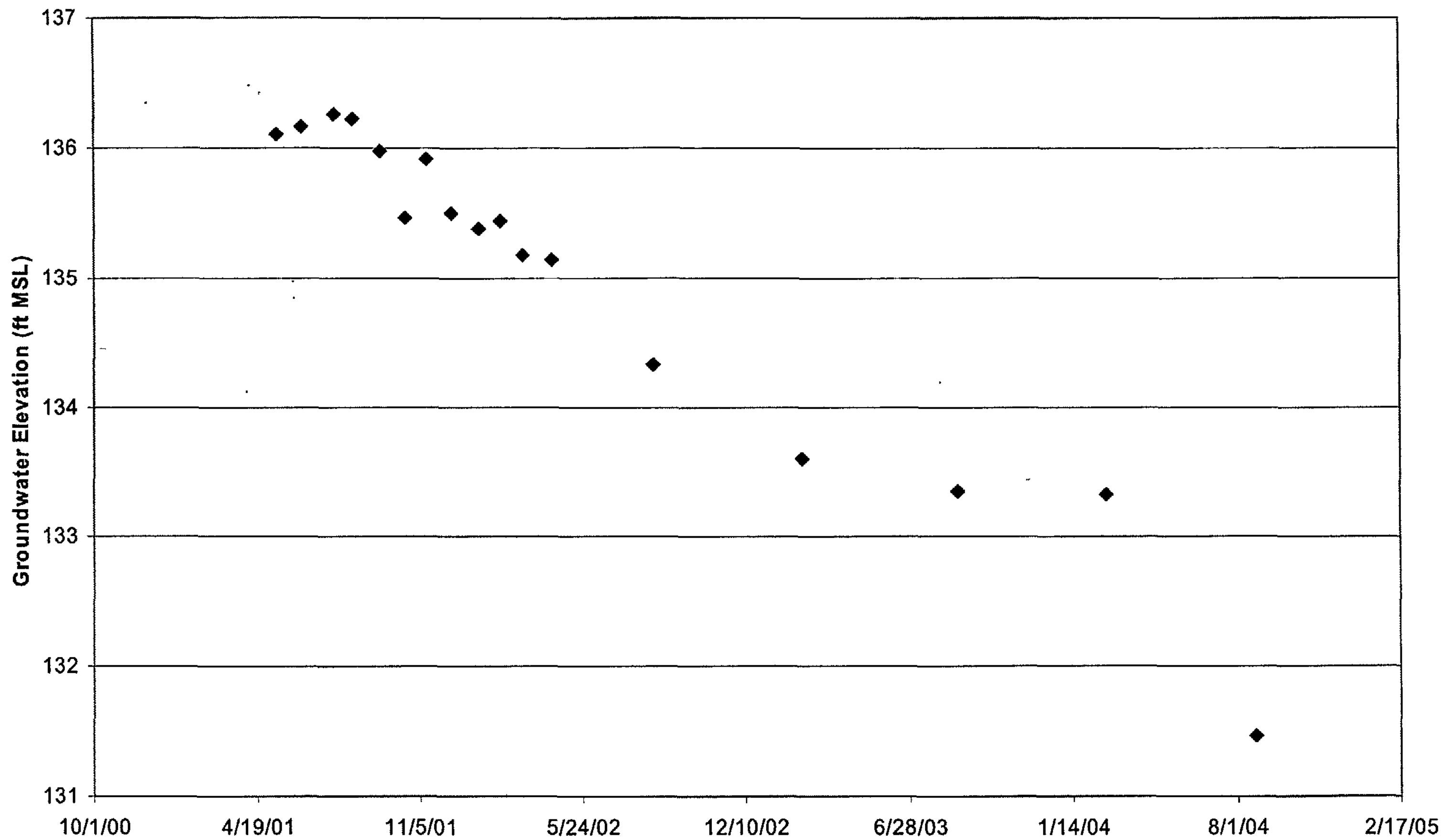

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Figure 19 Water Level Trend at OW-1

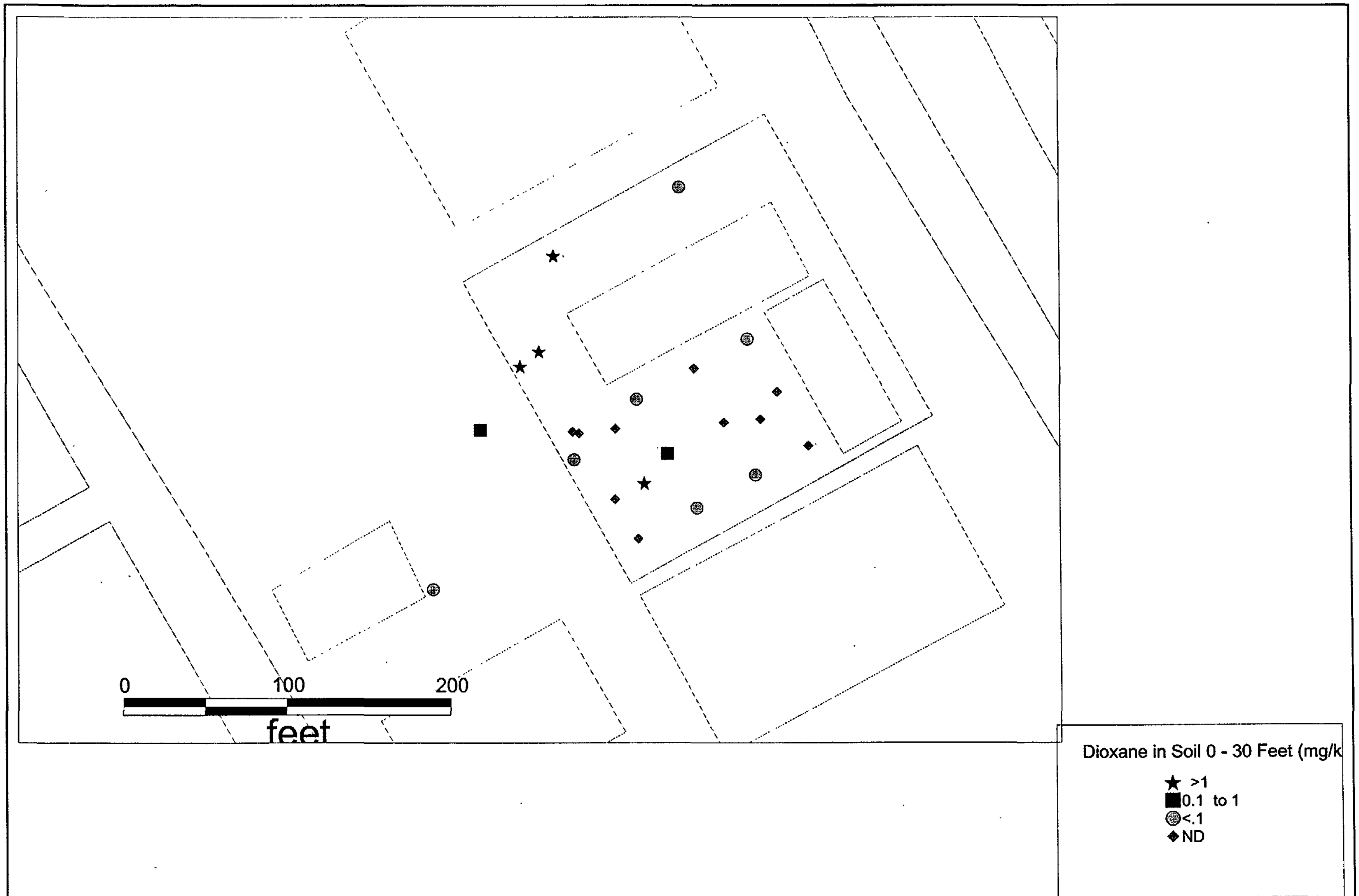

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Figure 20 1,4-Dioxane in Soil 0 to 30 Feet

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Figure 21 1,4-Dioxane in Soil > 30 Feet

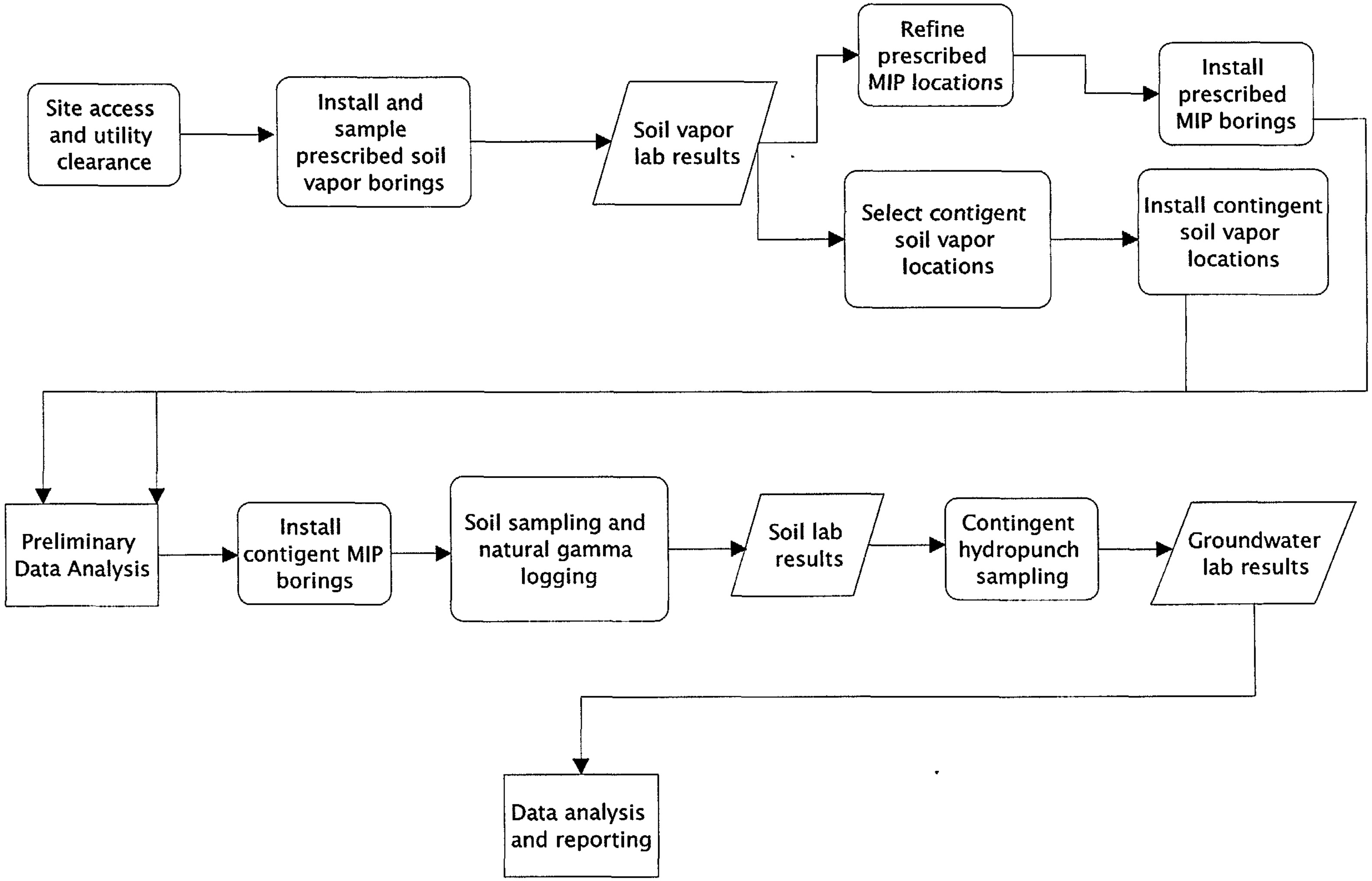

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Figure 22 Investigation Sequence

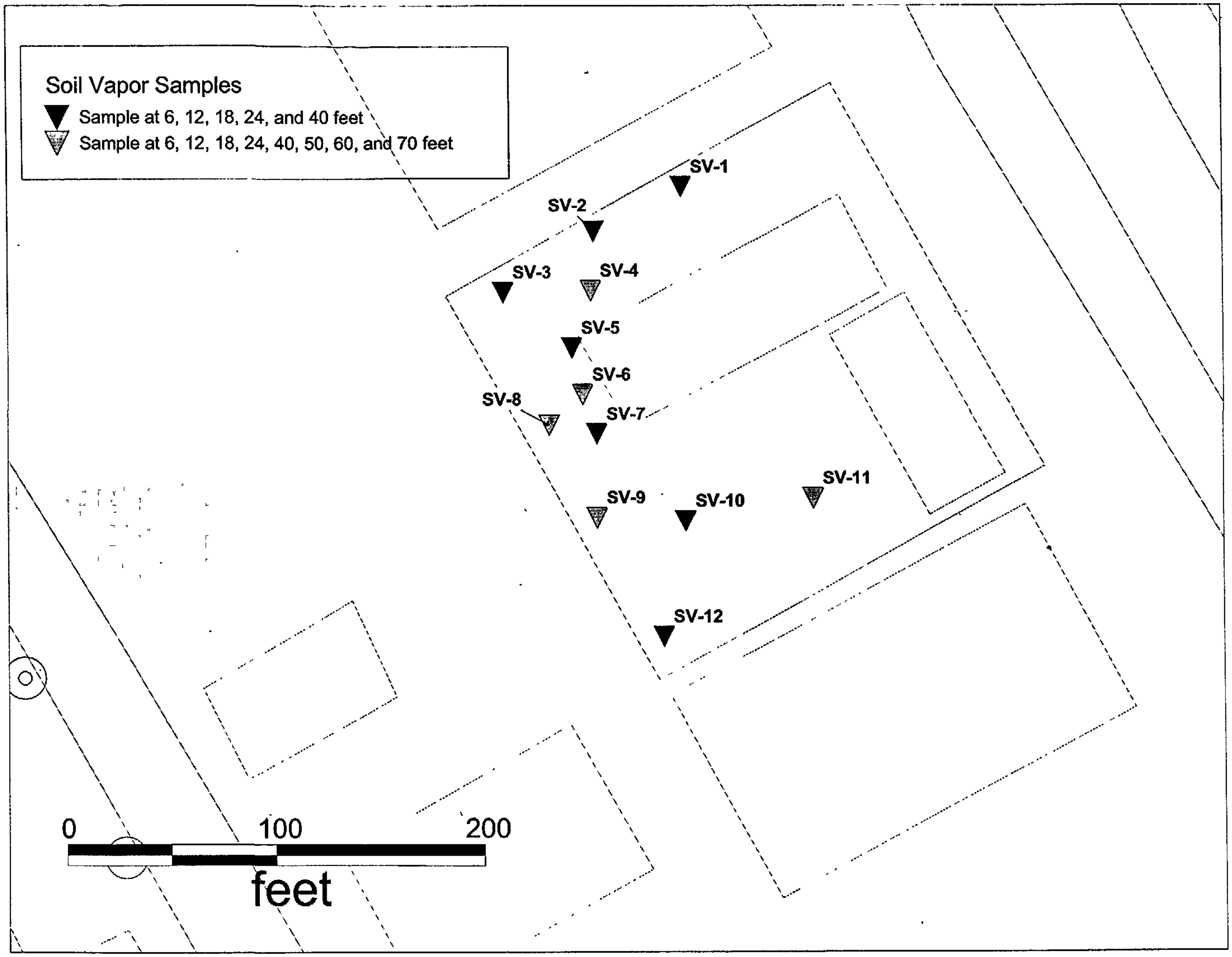

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Figure 23 Location of Proposed Soil Vapor Samples

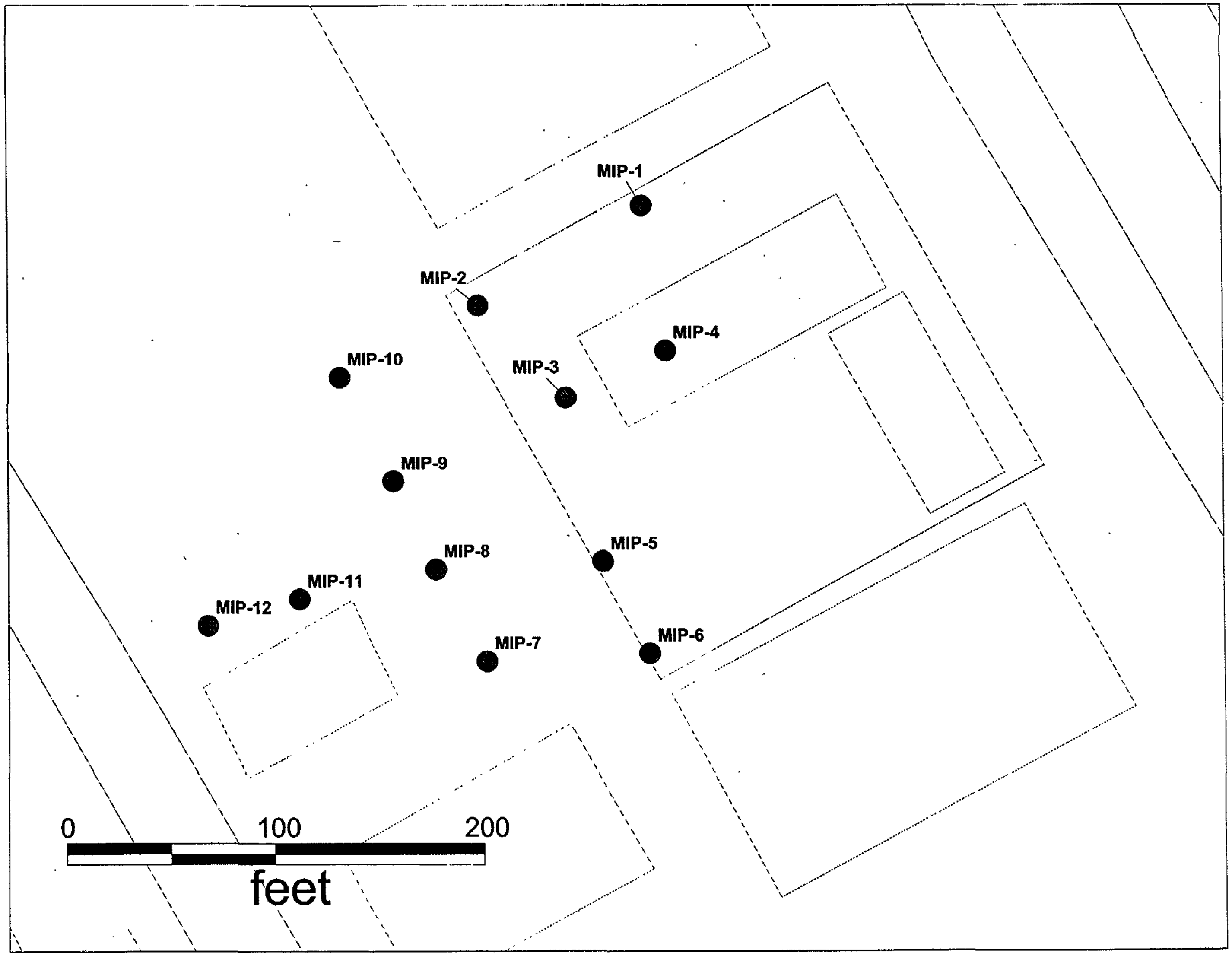

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Figure 24 Location of MIP Borings

Appendix A – Visualization CD-ROM

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